

Qihua Wang

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Education

PhD, Computer Science 05/2009
Purdue University
(received *Bilsland Dissertation Fellowship* and *CERIAS Diamond Award*)

MS, Computer Science 05/2007
Purdue University
GPA: 4.0/4.0

BS, Computer Science 07/2004
University of Science and Technology of China (USTC)
GPA: 91/100 Ranking: 2/163

Research Interests

Information security and privacy in general and the following topics in particular:

- Access control policy management
- Security and privacy in database
- Security and privacy in social computing
- Identity management in enterprises

Social computing, with focus on

- Social computing applications, such as collaborative filtering, bookmarking, and tagging
- Data mining, machine learning, and information retrieval in social contexts

Professional Experience

Internship, IBM Almaden Research Center, California 05/2008 - 08/2008

- Studied research problems on information management in social bookmarking and tagging systems, such as IBM Fringe Contacts and Dogear in Lotus Connections
- Designed and prototyped tools for Fringe and Dogear on automatic tag categorization, selective message distribution, and personalized tag recommendation and searching

Internship, IBM T. J. Watson Research Center, New York 05/2007 - 12/2007

- Conducted research on policy technology and identity management
- Designed and prototyped a policy optimization tool for IBM Tivoli Identity Manager

Teaching Experience

Teaching Assistant, Department of Computer Science, Purdue University

Computational Complexity (graduate) Spring 2007

Data Structure (undergraduate) Spring 2006

Cryptography (undergraduate) Fall 2005

Patents

Filed Disclosures

- **A System and Method for Selective Information and Resource Sharing based on People-Tagging**

Qihua Wang and Hongxia Jin, patent filed with IBM

We proposed a novel approach to automatically find users who are likely to be interested in the topic(s) of a given piece of information using people-tagging. Our approach can be used in a variety of applications, such as selective message distribution and advertisement targeting.

Disclosures under Review

- Three submitted technical disclosures in IBM Almaden Research Center in 2008. These disclosures are on information management in tagging systems.
- One submitted technical disclosure in IBM Watson Research Center in 2008. The disclosure is on identity management and access control configuration optimization.

Publications

Journal Articles

1. **Beyond Separation of Duty: An Algebra for Specifying High-Level Security Policies**
Ninghui Li and Qihua Wang
Journal of the ACM (JACM), Volume 55, Issue 3, pp. 1–46, July 2008
2. **Resiliency Policies in Access Control**
Ninghui Li, Qihua Wang, and Mahesh Tripunitara
ACM Transactions on Information and System Security (TISSEC), Volume 12, Number 4, pp. 1–34, April 2009
3. **Towards Formal Verification of Role-Based Access Control Policies**
Somesh Jha, Ninghui Li, Mahesh Tripunitara, Qihua Wang, and William Winsborough
IEEE Transactions on Dependable and Secure Computing (TDSC), Volume 5, Number 4, pp. 242–255, Oct 2008

Refereed Conferences

1. **Usable Access Control in Collaborative Environments: Authorization based on People-Tagging**
Qihua Wang, Hongxia Jin, and Ninghui Li
In Proceedings of *14th European Symposium on Research in Computer Security (ESORICS)*
Saint Malo, France, September 2009
(Acceptance rate: $42/220 = 19.0\%$)

2. **Access Control Policy Combination: Theory Meets Practice**
 Ninghui Li, Qihua Wang, Wahbeh Qardaji, Elisa Bertino, Prathima Rao, Jorge Lobo, Dan Lin
 In Proceedings of *14th Symposium on Access control Models and Technologies (SACMAT)*
 Stresa, Italy, June 2009
3. **Automatic Categorization of Tags in Collaborative Environments**
 Qihua Wang, Hongxia Jin, and Stefan Nusser
 In Proceedings of *4th International Conference on Collaborative Computing (CollaborateCom)*
 Orlando, FL, November 2008
4. **On the Security of Delegation in Access Control Systems**
 Qihua Wang, Ninghui Li, and Hong Chen
 In Proceedings of *13th European Symposium on Research in Computer Security (ESORICS)*
 Malaga, Spain, October 2008
 (Acceptance rate: $37/168 = 22.0\%$)
5. **Access Control Friendly Query Verification for Outsourced Data Publishing**
 Hong Chen, Xiaonan Ma, Windsor Hsu, Ninghui Li, and Qihua Wang
 In Proceedings of *13th European Symposium on Research in Computer Security (ESORICS)*
 Malaga, Spain, October 2008
 (Acceptance rate: $37/168 = 22.0\%$)
6. **Mining Roles with Semantic Meanings**
 Ian Molloy, Hong Chen, Tiancheng Li, Qihua Wang, Ninghui Li, Elisa Bertino, Seraphin Calo,
 and Jorge Lobo
 In Proceedings of *13th Symposium on Access control Models and Technologies (SACMAT)*
 Estes Park, CO, June 2008
 (Acceptance rate: $21/95 = 22.1\%$)
7. **On the Correctness Criteria of Fine-Grained Access Control in Relational Databases**
 Qihua Wang, Ting Yu, Ninghui Li, Jorge Lobo, Elisa Bertino, Keith Irwin, and Ji-Won Byun
 In Proceedings of *33rd International Conference on Very Large Data Bases (VLDB)*
 Vienna, Austria, September 2007
 (Acceptance rate: $91/538 = 16.9\%$)
8. **Satisfiability and Resiliency in Workflow Systems**
 Qihua Wang and Ninghui Li
 In Proceedings of *12th European Symposium on Research in Computer Security (ESORICS)*
 Dresden, Germany, September 2007
 (Acceptance rate: $39/164 = 23.8\%$)
9. **Direct Static Enforcement of High-Level Security Policies**
 Qihua Wang and Ninghui Li
 In Proceedings of *ACM Symposium on Information, Computer and Communication Security (ASIACCS)*
 Singapore, 2007
 (Acceptance rate: $33/188 = 17.6\%$)

10. **Beyond Separation of Duty: An Algebra for Specifying High-level Security Policies**
 Ninghui Li and Qihua Wang
 In Proceedings of *13th ACM Conference on Computer and Communication Security (CCS)*
 Alexandria, VA, 2006
 (Acceptance rate: $38/256 = 14.8\%$)
11. **Resiliency Policies in Access Control**
 Ninghui Li, Mahesh Tripunitara, and Qihua Wang
 In Proceedings of *13th ACM Conference on Computer and Communication Security (CCS)*
 Alexandria, VA, 2006
 (Acceptance rate: $38/256 = 14.8\%$)

Short Papers and Posters

1. **Selective Message Distribution with People-Tagging in User-Collaborative Environments**
 Qihua Wang and Hongxia Jin
 Extended abstract in *ACM SIGCHI Conference on Human Factors in Computing Systems (CHI)*
 Boston, MA, April 2009
2. **Usable Authentication for Electronic Healthcare Systems**
 Qihua Wang and Hongxia Jin
 Poster in *Symposium On Usable Privacy and Security (SOUPS)*
 Pittsburgh, PA, July 2008

Under Review

1. **On Authorization under Qualification and Security Constraints**
 Yuqing Sun, Qihua Wang, Ninghui Li, Elisa Bertino, and Mikhail Atallah
 Submitted to *IEEE Transactions on Dependable and Secure Computing (TDSC)*, 2008
2. **Satisfiability, Resiliency, and Delegation in Workflow Authorization Systems**
 Qihua Wang and Ninghui Li
 Submitted to *ACM Transactions on Information and System Security (TISSEC)*, 2008

Project Descriptions

IBM Open Collaborative Research: Security & Privacy

- *Fine-Grained Access Control in Relational Database*
 This project studies how to use fine-grained access control approaches to enforce data-owners' privacy in relational database. We have proposed correctness criteria for fine-gained access control, and designed and implemented two enforcement schemes for those criteria, one by modifying queries and the other by modifying the query evaluation engine of DBMS.
- *Formal Specification of Policy Combining Algorithms in Access Control*
 This project studies policy combining algorithms in access control languages. We have analyzed policy combining algorithms in XACML, identified several problematic cases, and pinpointed their causes. We have proposed a simple and flexible language to specify policy combining algorithms, and developed a generic technique to optimize the evaluation of any algorithm specified in the language. We have proposed to add our specification language to XACML standard.

- *Role Engineering in Enterprise*

This project studies using data-mining techniques to automatically construct and optimize the configuration of role-based access control systems. A policy optimization tool has been designed and prototyped for IBM Tivoli Identity Manager.

Collaborative Research with IBM Almaden Research Center: Collaborative Tagging Systems

This project studies how to apply machine learning and data-mining techniques to enhance tagging systems in collaborative environments. Our goals are as follows:

- *Automatic Tag Organization:* Tags are automatically classified into different categories by tagging systems so as to make it easier for users to browse information with regards to tags.
- *Selective Message Distribution:* Infer a user's interests based on his/her tags and other information so as to automatically distribute messages to users who are likely to be interested in the corresponding topics of the messages.
- *Enhanced Personalized Search:* Infer a user's interests based on his/her tags and other information so as to adjust the results of his/her search queries to reflect his/her personal interests.

Awards and Honors

Diamond Award for Outstanding Academic Achievements, CERIAS, Purdue University	2009
Bilsland Dissertation Fellowship, Purdue University	2008
Outstanding Bachelor's Thesis Award, USTC	2004
Outstanding Paper Award, USTC-Huawei Technology Scientific Paper Contest	2003
Zhang Zongzhi Sci-Tech Scholarship, USTC	2003
Zhang Zongzhi Sci-Tech Scholarship, USTC	2002
Outstanding Student Scholarship (First Class), USTC	2001

Programming Skills

Languages

- Fluent in Java, C, and C++
- Familiar with Prolog, and SQL
- Basic knowledge in Python, Perl, PHP, Javascript, and HTML

Selected Development Projects

1. Developed a proof-of-concept prototype of a tag categorization and searching tool for IBM Fringe Contacts when interned at IBM Almaden Research Center in 2008. The prototype is written in Java and contains 29 classes and more than 7000 lines. Demos have been given to the senior manager and several researchers in the user-focused systems department in IBM. A patent disclosure on our idea is under review in IBM.

2. Developed a proof-of-concept prototype of an automatic-recipient-selection component in an intelligent email system when interned at IBM Almaden Research Center in 2008. The prototype is written in Java and contains 30 classes and more than 6000 lines. IBM has decided to file a patent on our idea.
3. Developed a proof-of-concept prototype of a policy optimization tool for IBM Tivoli Identity Manager when interned at IBM Watson Research Center in 2007. The prototype is written in Java as an Eclipse plug-in and contains about 60 classes and more than 10,000 lines. Demos have been given to several management and development teams in IBM. A patent disclosure on our idea is under review in IBM.
4. Developed a SQL-query-revision tool to enforce user-privacy policies for our fine-grained database access control project in 2007. The tool is written in Java and works on Oracle database system. Results of our project have been published in VLDB 2007.

Professional Services

TPC Member

International Conference on Collaborative Computing (CollaborateCom), 2009

International Conference on Collaborative Computing (CollaborateCom), 2008

Graduate-Level Course Work

Operating Systems	Cryptography	Programming Language
Access Control	Computational Complexity	Artificial Intelligence
Information Security	Randomized Algorithm	Database Systems
Algorithms	Advanced Distributed Systems	Advanced Cryptography
Software Reliability	Logical Methods in Information Security	

GPA: 4.0 / 4.0

Spoken Languages

Chinese-Mandarin (native), Cantonese (native), English (semi-native)

References

Ninghui Li ninghui@cs.purdue.edu	Associate Professor Department of Computer Science, Purdue University
Elisa Bertino bertino@cs.purdue.edu	Professor Department of Computer Science, Purdue University
Hongxia Jin jin@us.ibm.com	Research Staff Member IBM Almaden Research Center
Jorge Lobo jlobo@us.ibm.com	Research Staff Member IBM Watson Research Center